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BEFORE THE NUTRITION SUBCOMMITTEE OF THE
COMMITTEE ON AGRICULTURE, NUTRITION, AND FORESTRY
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Mr. Chairman, we appreciate the opportunity to discuss with you the activities of the Department of Agriculture in human nutrition research. In doing so, we can freely speak for the Secretary, who has made nutrition research one of his high priorities for expansion. This presentation is the result of joint efforts by both of us and our staffs.

INTRODUCTION

Nutrition.--One hundred and fifty years ago a French lawyer and politician named Anthelme Brillat-Savarin wrote: "Tell me what you eat, and I will tell you what you are."

The writer had not discovered anything new. He merely was putting into words what has become a popular premise. For the food we eat-and the its nutritive value-has a measure of how we live from the beginning of the human experience been.

Nutrition touches almost all aspects of our existence. It is the fuel for human energy. It affects our physical, intellectual, and emotional lives. It affects our ability to avoid disease and recover from it. Its impact is felt at all stages of our lives, from infancy through school and adult years and into old age.

Nutrition is, in short, fundamental to human life, performance, and well-being. Adequate nutrition has, unfortunately, been one of the most elusive goals of an advancing world.

A Global Concern: Since World War II, food production in many nations has risen spectacularly. Technology has helped bountiful areas become even more bountiful. It has brought hope to some areas that were not so bountiful. But, despite this, the world food system is not working adequately for either rich or poor nations. Large and increasing numbers of people are still hungry or malnourished. In the poor nations there is often a lack of food. In the rich ones, people sometimes get too much food or the wrong foods in their diets.

We need to try to bring some balance to this system. For some time now, world leaders have recognized that we need a global food policy.

Dietary Goals for the United States have been issued by the Senate Select Committee on Nutrition and Human Needs. As you know, these were developed as an initial step towards providing the public and government agencies with goals and objectives that will improve nutrition in America. The Senate Committee is to be commended for taking such an important step ahead by issuing their version of such goals.

The Committee's Dietary Goals have aroused heated debate in the scientific community. This in itself is a positive outcome of the Committee's publication. It is forcing scientists to give serious consideration to their differences and can result in a concerted effort to resolve those differences by determining what is now known and what further research is needed to establish facts.

All of these developments point up the growing public concern about nutrition and the best use of information we now have. All of these developments indicate that our knowledge of human nutrition is incomplete. We need to know more.

Based on the findings of recent studies by several groups, we believe there is need to answer seven major questions:

1. What do persons need nutritionally for optimal growth, functional performance, and continued well-being?
2. What are people actually eating, and how does this affect their nutritional health?
3. What factors actually shape people's eating habits?
4. What happens to our food from its origins on the farm until we eat it; and how do all the steps in between affect the safety, quality, and nutritional value of our diets?
5. How do government intervention and nutrition education programs affect the health, nutritional status, and performance of the people they are intended for?
6. What are the nutritional effects of agricultural and other government policies and regulatory programs?
7. What are the special considerations we must take into account in helping meet the dietary needs of people in other countries?

These are the questions we must answer.

The Challenge:--It is a challenging task. But it is a task that this Nation has the resources to accomplish. If our capacity for research and development

is used more effectively and supported adequately, we can do three things:

- . We can deal with the growing evidence that in rich countries such as ours the content of diet is a significant factor in
- . We can do more to alleviate world hunger and malnutrition.
- . We can help make the world food system work better for both the rich and poor nations.

It has been estimated that from 500 million to a billion persons in the world do not receive enough food. In a speech last May, the President said:

"More than 100 years ago, Abraham Lincoln said that our Nation could not exist half slave and half free. We know a peaceful world cannot long exist one-third rich and two-thirds hungry."

There is no need to document this Nation's sense of humanity toward the troubles of the world in years past. When there was need, we moved to meet it. Now, if it was necessary, the President's message has given us an additional reason for moving once again.

Current Nutrition Research Efforts

Now, before we further delineate our priority needs for human nutrition research, we want to describe the efforts that are currently in progress.

Two Federal departments, USDA and HEW, share the predominant responsibility for human nutrition research. This is appropriate because scientific knowledge about nutrition is essential to both the food and agriculture

mission of USDA and the health mission of HEW. The recently-enacted Food and Agriculture Act of 1977 recognized this duality. It gave USDA the leadership in food and agriculture research, except for the biomedical aspects of nutrition concerned with the diagnosis and treatment of disease. It directed the two Secretaries to work together in areas of nutrition research that are of mutual interest. Prior to the passage of this Act, Secretary Califano and Secretary Bergland signed an agreement for sharing their nutrition research responsibilities.

USDA Overview.---Nutrition research in the USDA is cooperative among the State agricultural experiment stations, 1890 land-grant institutions, Tuskegee Institute, other universities, and USDA in-house agencies. A total of \$31 million was provided by USDA in FY 1978 for this work. The cooperating universities provided approximately \$12 million from State and other sources.

Human Nutrition Center.---The primary USDA unit which conducts basic research on nutritional needs and composition of specific foods is the recently established Human Nutrition Center (HNC) within the Science and Education Administration. It gives sharper focus and priority to human nutrition research. The Center contains 7 laboratories and institutions, with a \$15.2 million budget in FY 1978.

Nutrient Requirements.--Research on nutrient requirements for optimum human growth, functioning, and well-being is conducted in the HNC by laboratories concentrating on carbohydrate nutrition, lipid nutrition, protein nutrition, vitamin and mineral nutrition, and trace elements nutrition. Research on mineral requirements has shown that mineral metabolism is influenced by age, stress, and body hormones. This research helps to determine recommended dietary patterns that will assure people safe and satisfactory levels of available minerals.

Research on carbohydrates, lipids, and other macronutrients helps determine our nutritional requirements and discover what influence food has on the development of arteriosclerosis and other degenerative diseases. It may also identify people who must control their diets to avoid or delay health problems.

Nutrient Composition.--Analysis of the nutrient composition of specific food products is conducted in the HNC by the Nutrient Composition Laboratory (NCL). The USDA for many years has published the fundamental compendium of the nutrient content of foods: Agricultural Handbook Number 8, "Composition of Food--Raw, Processed, and Prepared." An extensive revision of the last edition is underway. Two sections have already been published.

Up-to-date knowledge on nutritive composition is still limited. The Nutrient Composition Laboratory was created to expand this knowledge substantially. Still more data is needed on the nutrient content of processed foods, and of food items served outside the home. More information is also needed on nutrient classes such as zinc, copper, and chromium. The lack of

appropriate and reliable methodology for the assay of significant nutrients is a continuing problem. It is being addressed at the NCL through the development of improved methods for the extraction, identification, and measurement of nutrients in foods. The NCL will continue to use its capability to conduct initial analyses and to verify the authenticity of industry analyses and nutritive labeling claims.

Food Consumption and Use.--The Consumer and Food Economics INstitute conducts the National Food Consumption Survey every 10 years to assess the eating patterns of the nation through a sample of 40,000 people. The survey is based on food intake over a 3-day period.

The objectives of the current survey are:

1. To provide accurate, up-to-date and comprehensive information in a readily usable form on food consumption and dietary levels.
2. To provide assistance on food and nutrition problems and sound guidance materials on nutrition for the consumer as well as educators, program leaders, and food managers; to identify techniques which will assist people in selecting nutritionally adequate diets within different budget limitations; to identify means to modify undesirable food habits, and to strengthen nutritionally desirable food choices.
3. To identify and develop suitable and safe procedures for food preparation by home and institutional consumers, for best retention of both nutritional qualities and taste appeal and to avoid food-borne illness.

Economic, Statistics, and Cooperatives Service.--Consumer preference and marketing research studies are conducted by the Economics, Statistics, and Cooperatives Service (ESCS) of USDA. The ESCS also conducts policy analysis and assessments, collects basic statistics on food consumption, demand, and prices, and maintains data series on per capita food consumption by type of food.

Current social sciences research in ESCS on factors affecting food choice adds to our knowledge about consumer behavior as it is related to food and competing goods and services. It provides the basis for analyzing and evaluating all food-related Federal programs.

ESCS also has a research program underway to evaluate the effectiveness of USDA's food assistance programs. The research unit cooperates with analysts in the Food and Nutrition Service (FNS).

Finally, the USDA International Development Staff conducts research and provides technical assistance to the Agency for International Development (AID) on food fortification, special weaning foods, and systems to deliver special foods and low-cost nutritious foods to target groups.

Competitive Grants Research.--A new USDA competitive grants program was recently initiated in the Science and Education Administration. It is based upon a recommendation of a study panel of the Office of Technology Assessment. Congress appropriated \$5 million for such grants in human nutrition research for FY 1978. This program adds a flexible new dimension to the Department's human nutrition research, since the grants can attract scientists from all over to work on priority problems in nutrition.

Cooperative Research.--The Deputy Director for Cooperative Research (CR) in the Science and Education Administration (SEA) administers funds for extramural research in addition to the competitive grants. These funds go to:

- . State agricultural experiment stations. Funds are allocated directly to States under the Hatch Act as amended in 1955. During FY 1976, funds expended on human nutrition research through this program amounted to 29 percent of the total spent on human nutrition research by the experiment stations. The other 71 percent were State and State-generated funds.
- . The 1890 land-grant schools. Projects are approved by CR, within approved research programs.

The regional cooperative research program, supported in part by Hatch funds, is a means of pursuing problems too large for one research group to attack. The research is developed and pursued by CR personnel, State agricultural experiment station directors, and human nutrition scientists, including those in other Federal agencies.

Current research underway includes: nutrient requirements and nutritional status of special population groups such as children, low-income persons, and the elderly; metabolic functions of nutrients in the diet and their interaction; effects of processing on nutrients; food delivery systems; and dietary patterns.

Other USDA Nutrition Research.--Both the Food Safety and Quality Service (FSQS) and the Animal and Plant Health Inspection Service (APHIS) have extensive laboratories and conduct "applied" research and testing to support the regulatory activities for food safety and the plant and animal disease control programs. Both programs affect food safety and quality.

FNS, which administers food stamp, school lunch, and other food assistance programs, conducts evaluations of their effectiveness in improving the nutritional and economic well-being of participants.

Priority Needs

We do not pretend, however, that our present efforts are adequate. Compared to other sciences, nutrition is still in its infancy. Support for nutrition research has lagged far behind the rapid changes in food production, technology, processing, packaging, and advertising that have revolutionized food markets since World War II. The result is that we understand little about the real effects of these changes on human diets and health.

Until recently, the public gave nutrition little attention. But that too has changed. Widespread apathy has been replaced by a growing concern. People worry about what they eat, what it costs, and what its effects are. The public is looking to the science of nutrition to help provide the answers. Government, with its major responsibilities in the field, must take a leading role in filling the knowledge gaps.

Earlier in our presentation, we stated seven major questions about human nutrition for which research answers are needed if the knowledge gaps are to be filled. We shall now discuss the priorities for answering each of these. You will find that these priorities include those cited in Section 1422 of the Food and Agriculture Act of 1977.

The first question is: What do persons need nutritionally for optimal growth, functional performance, and continued well-being?

Progress in gaining knowledge about what persons need to eat has given us control over major nutritional deficiency diseases in the U.S. Compared to the answers needed for optimal growth, functional performance, and continued well-being, answers on major deficiencies have been relatively easy to obtain. Thus, the "cream has been skimmed off" certain aspects of nutrition research. The answers we still need are generally more elusive and require innovative methodology to obtain. Yet, all evidence points to the likelihood that these will be the most important answers yet attained.

We need research on the requirements of persons in all stages of life, with special emphasis on prenatal children, 6 to 23 month-old infants, pre-school youngsters, adolescents, women of childbearing age, and the aged.

Within age groups, we find a paucity of knowledge about nutrition and intellectual and emotional growth and development, pregnancy, lactation, menopause, and work performance.

Here are some of the research priorities:

Absorption Studies.--We need to know why individuals vary in their capacity to absorb and use various nutrients. Although many such studies have been done on infants, we still have critical gaps in knowledge of their capacity to absorb starch.

Absorption data is particularly lacking for children and the elderly. We should address the specific problem of lactose digestion and absorption in adolescents.

Pregnancy.--Pregnancy compresses and magnifies processes of growth and differentiation, making the fetus and placenta very sensitive to nutrient deficiencies and excesses. Roughly, 10 percent of the three million babies born each year in the U.S. weigh less than 5-1/2 pounds and 50 percent of these babies show evidence of intrauterine growth retardation. Although something is known of protein and caloric requirements during pregnancy, much less is known about the need for minerals and vitamins.

Animal studies have shown that deficiency of manganese, copper or zinc during pregnancy can produce neurologic and other congenital abnormalities in the offspring which mimic various genetic diseases of man. The effects of these hereditary disorders can be ameliorated by supplementing the mother's diet with the appropriate mineral. Such findings represent a major research advance, because they show that the manifestation of some congenital abnormalities depends on the mother's nutritional status during pregnancy.

The major research tasks now are to develop accurate methods of quantifying a pregnant woman's nutritional status, to discover more nutrient/genetic interactions in both animals and man, and to develop appropriate nutritional intervention in pregnancy in order to prevent the birth of physically or mentally damaged offspring.

Infancy.--Advances in our understanding of intermediary metabolism in low-birth-weight infants have made it necessary to consider decreasing the protein and electrolyte concentration of infant formulas. Further studies on the role of taurine, which is found in human milk but not in cow's milk, might indicate a need to consider the nature and quantity of certain components of human milk and how these function biologically, especially in the growth of low-birth-weight and sick infants. Such research will pave the way for the improvement of commercial formulas in general and for the development of special formulas to meet the specific nutrient requirements of low-birth-weight infants.

Preschool Children.--The Federal Government has an extensive program to improve the diets of young children. There is a particular need to determine the nutrient requirements for optimum growth, function, and well-being for 2 to 6-year olds.

Research in the development of this vulnerable group is crucial to getting the most out of what we spend on their education and care. This is especially important because nutrition affects the functioning of the central nervous system which in turn affects learning and behavior.

The Elderly.--Despite the fact that persons over 65 years of age represent over 10 percent of the U. S. population, little is known about their nutritional requirements or the relationship of nutritional status at different stages of the life span to longevity. We need to know whether and how the metabolism of certain nutrients in the elderly differs from that of other age groups.

Studies are needed of the level of nutrient intake in relation to the prevention and moderation of degenerative processes and of the specific effects of vitamin and trace element supplementation on the physical performance, health, and well-being of this population group.

Work Performance.--The recommended daily allowances of nutrients for healthy persons are based on research data and judgmental estimates of such individual factors as age, sex, body size, and activity.

Even though these allowances have been widely used, they are very limited in regard to their value in helping a person select the proper diet or diets for his own age and life style. An entirely new approach to nutrient requirement research is needed for this purpose.

Such research should do far more than set standards to prevent illness. It should identify the nutrients required for various levels of function and performance. With such information, an individual could intelligently select a diet to fit the needs for a day, a week, or a year and vary that diet as the needs change. The information could provide a rational basis for eating and for the efficient use of food. It not only can provide a revolutionary basis for savings in food expenses, but also for improving performance at work and at leisure, in both physical and mental activities.

The knowledge gap in this area is enormous. Information exists only in bits and pieces and often consists of little more than educated guesses. When appraised in relation to similar knowledge of diets for livestock, the lack of information is appalling.

New methodologies for estimating the effects of nutrients on human performance are essential to the success of this research. Despite the difficulties, however, this is a highly researchable field and the potential benefits to human function, performance, and satisfaction are great.

Obesity.--Obesity, the most widespread nutritional disorder in the U.S., is a primary risk factor for diabetes, and cardiovascular disease. Currently, about 30 percent of middle-aged American males and 40 percent of the females are considered obese.

Despite the magnitude of this problem, the fundamental causes remain obscure. The public spends large sums on diet foods and weight reduction schemes and has poor understanding of the basic mechanisms, benefits, and risks.

Before effective therapy can be offered, the various types of obesity must be explained and the contributing variables clarified. Standards for diagnosing obesity must be developed so that the desirable body weights recommended to the public are supported by valid scientific data.

Research is needed on the role of genetics and biochemistry in the development of taste, since taste preferences guide eating patterns. Current evidence indicates that eating behavior may be determined very early in life--by the imprinting of nerve centers in the hypothalamus.

Precisely how the composition and quantity of dietary intake in infancy may affect the setting of these centers is an area of investigation that holds great promise for understanding the drive to eat, as well as the drive to over-eat.

We need to clarify the interactions between these internal regulatory mechanisms and external psychological/environmental factors which may override the internal mechanisms. Further studies on the kinetics and metabolism of fat cells and the role of overfeeding in infancy and childhood on adult obesity are needed in order to justify appropriate dietary modifications.

Iron Deficiency.--Next to obesity, iron deficiency is the most common known nutritional disorder in the U. S. Yet the effects, if any, of iron deficiency on physical and mental performance, ability to resist infection, and long-term survival are poorly understood.

Research is insufficient to keep pace with the newly-discovered problems. The few nutrient relationships that have been studied in animals (calcium/iron ... calcium/lead) must be investigated in humans and translated into practical dietary guidelines.

More work is needed on the role of fiber in inducing zinc and copper deficiency.

Special nutrient interactions that may occur in the intravenous feeding of ill patients when the body's normal absorptive mechanisms are by-passed also require attention.

Techniques for conducting necessary research on toxicity and nutrient interactions have been improved.

Because of ethical considerations, human studies generally must be limited to retrospective or epidemiological evaluation of problems that occur accidentally. The major portion of these studies can be accomplished using animals, including sub-human primates.

The extent to which iron deficiency can be prevented through supplementation of food with iron must be explained. These issues are now amenable to study because new laboratory methods permit a more effective determination of iron stores in humans and of the biological availability of iron in iron-enriched food.

Nutrient Toxicity and Nutrient Interactions.--In recent years, there has been a steady increase in the quantities of vitamins and essential mineral elements purchased by the public for self-medication or insurance against presumed dietary deficiency. There is a mistaken belief that excessive intake of nutrients poses no health problem.

Most of the nutrients that we know are essential for human growth and development are also known to be toxic at levels above recognized requirements. The level at which acute toxicity occurs has not been determined for most essential vitamins and minerals. For those where data are available, the margin of safety is sometimes small -- for vitamin D, only five times the recommended daily intake is toxic in some individuals. This margin is substantially less than the 100-fold safety factor required for the approval of new food additives.

Equally important to human health is the need to understand chronic toxicity. The acute and chronic toxicity of all essential vitamins and minerals should be established. A continued lack of toxicity data will preclude

effective education and regulation and may well result in adverse health effects for significant numbers of unsuspecting people.

Dietary levels of nutrients required to meet human needs are known to be influenced by interactions with other nutrients ... with drugs such as antacids, analgesics, sleep medications, birth control pills ... with food additives and dietary supplements ... with environmental contaminants, such as lead, arsenic, cadmium ... and with various chemicals that occur as a natural component of foods. Identification of such nutrient interactions is becoming increasingly important with the ever-increasing exposure of our population to such compounds.

The second question is: What are people actually eating and how does this affect their nutritional health?

American supermarkets today offer consumers the opportunity to choose from among some 11,000 different products. New products are introduced almost daily. Other products disappear from the shelves. Our food supply is a kaleidoscope of constantly changing packages, products, formulas, and conveniences.

The upshot is that people's eating patterns are likely changing faster than we can monitor them with present techniques. Therefore, the first order of business is to revise the methods we use to find out what individuals eat, and find new ways to measure the nutritional impact.

Presently, the Federal Government uses two principal means of monitoring American diets. First is the National Food Consumption Survey conducted once every 10 years by the Department of Agriculture. The survey assesses the eating patterns of a sample of 40,000 people, based on their food intake over a 3-day period

The second principal method of monitoring diets and nutrition is the Health and Nutrition Evaluation Survey (HANES), conducted by DHEW's National Center for Health Statistics with help from the Center for Disease Control. It provides historical, laboratory, and clinical data on the health and nutrition status of a sample of 30,000 individuals.

There are serious limitations in both the methods and the timing of the surveys. A 10-year interval between USDA's food consumption surveys is too long to keep up with today's rapid changes in foods and eating habits. It also means the survey does not mesh with the more current nutrition data of the HANES survey.

The most common survey technique--the dietary recall system--has built-in potential for error. It asks the participant to remember and tell the interviewer what he ate over the last 24 hours or so. Doing that with any degree of accuracy is exceedingly difficult, especially with the incredible variety of processed foods on the market today.

Clinical and laboratory tests have problems too. Those presently in use are slow, cumbersome to administer in the field, and difficult to analyze. NCHS has not had the resources to complete analysis of a good deal of the nutrition-related data it has collected through the HANES studies.

Considering these and other problems, the most urgent research needs are as follows:

Survey Methods

First, we need to develop a fast and relatively inexpensive method of collecting food consumption information. Such a development

will enable the Departments of Agriculture and Health, Education and Welfare to get information that will accurately portray changing dietary habits. It will also facilitate studies of certain high-risk groups that we need to know more about -- especially the poor, infants, and the elderly.

We urgently need a coordinated system to measure trends in consumer buying patterns. We must change or improve old survey techniques of asking people to recall what they ate or to keep diaries on their food. Consideration should be given to such possibilities as using new automatic checkout and perpetual inventory systems of commercial food establishments to provide continuous food consumption data.

. Simple Lab Tests

There is need to develop more precise clinical and laboratory methods for measuring and evaluating changes in nutritional health. Breakthroughs will depend upon basic physiological, biochemical, and genetic studies as well as on epidemiological research. What is needed are simple, rapid screening methods that are more sensitive, specific, and reliable than those currently available for application in the field. We urgently need to do the research and development required to produce these.

Correlation of Data

There is obvious need for better correlation of the clinical and laboratory data collected in the HANES study conducted by DHEW and the information collected in USDA's Household Food Consumption

Surveys. The two Departments are working on that now, but without new survey and analytical methods complete coordination will be difficult.

. Complete Analysis

We must see that resources are provided to complete analysis and indexing of the nutrition data already collected in the HANES studies. For example, tabulations are yet to be completed on nutritional biochemistry and food consumption information collected in past years. Tapes of data should be indexed so that other agencies can draw upon them.

. Epidemiology Studies

Nutrition-related epidemiology studies need to be expanded to get as much information as possible on toxic reactions to nutrients as well as on results of nutritional deficiencies when they occur at home and abroad.

The third question is: What factors actually shape people's eating habits?

Efforts to formulate national nutritional policies or to design intervention programs, educational programs, or possible regulatory actions need to be based on knowledge of the factors affecting consumer choices.

. The Factors

These factors include price, income, family size and composition, advertising and packaging, labeling, wholesale and retail marketing practices, convenience of preparation, education, health status, individual and family attitudes and lifestyles along with organoleptic properties.

Emphasis should be placed on identifying factors most readily influenced by education and information.

Research should focus on determinants of food consumption behavior and barriers to dietary adequacy in such vulnerable groups as pregnant women, infants, the elderly, as well as certain culturally-defined population subgroups which may have poor dietary practices.

The effort should draw on findings from such diverse areas as anthropology, sociology, market and communications research, general education research and basic medical and food science studies on taste preferences.

The fourth question is: What happens to our food from its origins on the farm until we eat it, and how do all the steps in between affect the safety, quality, and nutritional value of our diets?

Informed choices of the food we eat as well as the design of food intervention programs depend on basic knowledge of the nutritional composition of foods. Data are lacking on the amounts of important food nutrients and the availability of nutrient forms that occur in various foods. Much of the current information is obsolete because of the changes in agricultural production, the introduction of new varieties and processing methods, and new storage and transportation facilities.

Here are the research needs:

- (1) Investigation of the factors affecting the ability of people to utilize nutrients in specific foods, as well as factors affecting the chemical form of the nutrient, its relationship to other nutrients, and the presence of inhibitors.

- (2) Study of the nutrient changes in foods that occur after harvest or slaughter and during processing and distribution.
- (3) Determination of the social and economic feasibility--and nutrient possibilities--of new or improved food processes.
- (4) Conversion of scientific findings from public and private laboratories into readily useful information for consumers, public agencies, and private businesses and organizations.

Studies of changes in nutrient content due to production, processing, and handling practices should be expanded. True, industry research has expanded because of food labeling regulations, but it includes only limited groups of foods. Because of the multitude of commodities, processes, and practices, there is still need to increase the effort, particularly to develop information that can be used in considering new processes and practices.

Expand Federal Food Composition Measurement Capabilities.--The bulk of food composition measurements will continue to be conducted by industry, but certain types of information are needed which industry is not likely to provide. These include:

- . Variations in the nutrient content of foods according to seasons, storage times, and processing methods. Most of the emphasis has been on avoiding spoilage rather than on minimizing nutrient degradation.
- . Status of the Nation's food supply and changes over time special emphasis should be placed on the amounts of particular nutrients or contaminants in the total food supply which may constitute a public health hazard at certain levels.

Some food composition measurements are conducted by HNC (Nutrient Composition Lab), by FDA (Market Basket" Survey of foods for both environmental contaminants and nutrients), and CR.

Current USDA and FDA laboratory capacity, both in government and contract facilities, is too small for the food composition measurements that should be performed. Laboratory capabilities need to be increased or provision for contract services expanded so that necessary measurements can be made.

Update Food Composition Information in the National Nutrient Data Bank.--

The National Nutrient Data Bank is intended to be the central repository for nutrient composition data, providing detailed information on individual food products and aggregated data on classes of food products. These data are important for planning diets to meet nutritional requirements. They are also important in determining nutrient intakes and nutritional deficiencies of selected populations when used in conjunction with food consumption data collected through surveys. The Consumer and Food Economics Institute of USDA operates the data Bank.

Data on virtually all of the food groups are out of date. No data are available for many of the newer processed foods. Substantially increased efforts need to be applied to bring the data bank up to date quickly and to make such information available to consumers and to institutions providing meals.

Develop Improved Methods for Food Composition Analysis.--The methods currently available for analysis of many of the known nutrients are slow and imprecise. For some nutrients, no standard analytical methods exist.

Standard measurement procedures and reference materials must be developed so that tests can be accurately performed and readily validated. Particular areas that need to be addressed include the development of:

- . More rapid analytical procedures.
- . Methods that will distinguish among chemical nutrient forms with differing degrees of bioavailability -- like vitamin D.
- . Extraction techniques for the measurement of the nutrient contents of compound or complex foods -- stews, baked goods.
- . Automated or semi-automated food composition measurements allowing for rapid measurement of many nutrients.

The fifth question is: How do Government intervention and nutrition education programs affect the health, nutritional status, and performance of the people they are intended for?

This is one of the most difficult questions to answer. It is a problem with government food assistance programs, food fortification and enrichment activities as well as nutrition education. Clearly we need to develop better methodologies for measuring the effectiveness of such programs.

To be useful, such measures should cover not just nutritional values, but also the performance results such programs achieve in behavior changes, social and economic benefits, and public acceptability. A school lunch program that serves nutritionally perfect meals but is carried out in a noisy, unappealing environment may not do much for a child's view of school or his educational achievement. We need a broad and scientifically valid measure of what these and other food programs accomplish and where they need improvement.

Evaluations of program effectiveness must then be followed up with development and testing of methods to strengthen the operation and effectiveness of government food intervention programs. The need is particularly acute in nutrition education programs. We have a long way to go in designing information programs that effectively combat food and nutrition misinformation, inform the public on food safety, and encourage people to change their food habits. We need to determine which communication tools work best in getting people to modify their food choices.

Priority must be given to designing and carrying out surveys on diet practices to determine which groups in our population are most vulnerable to poor food habits. More work should be done to evaluate alternative food intervention programs and develop testing evaluation methodologies for food fortification.

The sixth question is: What are the nutritional effects of agricultural and other U.S. Government policies and regulatory programs.

Currently, there are no studies being done to find out the impact of various government policies on the nutritional health of our people. This is an area we must address if we are to arrive at a coherent, comprehensive nutrition policy. It means we must look not just at the government policies directly related to food production and distribution, but also at many others that relate indirectly to nutrition but nonetheless have a profound effect on eating patterns.

More specifically, we need research on the nutritional effects of government activities in establishing and enforcing food grades and standards; packaging, labeling, and advertising requirements; and other measures to regulate marketing practices.

We need to know the nutritional impact of government crop adjustment programs, of our international trade policies, and grain reserves.

How is human nutrition affected by food production strategies, agricultural research and extension programs, rural credit services? Beyond those programs directly related to food, we need to look at the effects on nutrition of welfare and other income subsidies, income taxes, manpower policies, health, environmental health and other general government policies.

We must be particularly concerned about the effects of government policies on those most vulnerable to malnutrition -- the poor, the young, and the elderly.

The seventh question is: What are the special considerations we must take into account in helping to meet the dietary needs of people in other countries?

From 500 million to one billion people in this world suffer from extreme malnutrition and hunger. The President's commitment to aid these people makes human nutrition research vitally important.

Our research should assist all countries, but especially those whose people face extreme hardship. Therefore, the design of these studies must take into account a range of circumstances that may differ widely from our own.

Such considerations should include:

- . The dietary needs and food practices of other countries.
- . Differing political and cultural systems.
- . The impact of land reform in some areas.
- . The effects of low protein, low-calorie interactions and other nutritional deficiencies on the growth and development of children.

- . High incidences of disease and stress conditions in many countries.
- . Waste and inefficiencies in food production.
- . The lack of worldwide data systems on food supplies and lack of early warning of impending food shortages.
- . The need for research methodology tailored to the people and circumstances of other countries.

Actions Taken To Meet Priority Needs

Meeting the requirements of such a list of priority needs is a sobering and demanding obligation. However, we have already taken steps towards meeting them. Many of these actions are in response to provisions of Title XIV of the Food and Agriculture Act of 1977.

Competitive Grants

As mentioned earlier, Congress appropriated \$5 million in FY 1978 for competitive grants in human nutrition research. With the help of an ad hoc Federal-State working group, we have developed guidelines for soliciting and awarding these grants. The guidelines will ensure that the awards are open to all qualified scientists. Two peer panels will be established for reviewing proposals. One for the biological sciences and one for the social sciences.

The guidelines also indicate the major subject areas of emphasis for the first year of grants. The guidelines will be published shortly in the Federal Register. Advanced copies of the guidelines have already been sent

to some 250 colleges and universities, with the request that they be reproduced locally and distributed to interested scientists. Pertinent extracts of the guidelines have been sent to three dozen professional associations and societies with the request that they advise their membership.

The President's budget for FY 1979 requests a \$6 million increase in these grants. Research areas to be emphasized with the increased funds will include (a) determining food habits, acceptability, safety, and nutritive value and (b) developing information on nutrient composition of foods and the effects of agricultural practices, handling, food processing, preparation and cooking of foods on nutrients.

Human Nutrition Center

Section 1423 of the 1977 Farm Bill directed the Secretary to establish human nutrition research as a separate and distinct mission of the Department. In response to this directive, the Department has established the Human Nutrition Center as part of the new Science and Education Administration. We are currently conducting a nationwide search for the Administrator of this Center.

The Center will administer the funds and direct the Federal research on human nutrition formerly directed by the Agricultural Research Service. The Center also has program management responsibilities for cooperative research with the universities in human nutrition. As part of the Science and Education Administration, HNC nutrition scientists can collaborate more effectively than before in interrelated areas of plant, animal, and human

nutrition research. The Center will provide leadership for collaborative efforts in human nutrition research, extension, and teaching, both nationally and internationally.

Title XIV of the 1977 Farm Bill established a Joint Council for the Food and Agricultural Sciences. The membership of this Council is made up primarily of researchers, extension specialists, and teachers. In developing plans for that Council, we are including two experts in human nutrition science.

Title XIV of the 1977 Farm Bill also provided for a National Agricultural Research and Extension Users Advisory Board. This Board represents those who use or are affected by the activities of agricultural research, extension, and teaching. The law states that two members of the Board shall be engaged in human nutrition work. The plans for membership of the Board are in full compliance with this requirement. We also will establish a panel on human nutrition as requested in the Conference Report (S. Report No. 95-418) on this Act.

In addition, the Department is planning to establish a Committee on Human Nutrition Policy. It will be co-chaired by the Assistant Secretary for Food and Consumers Services and the Assistant Secretary for Conservation, Research, and Education. Membership will include administrators of appropriate agencies and other representatives. The functions of the Committee will include appraising nutritional implications of Department

policies and programs and identification of program needs. It will assure close coordination between the Department's human nutrition research activities and the nutritional aspects of other departmental programs.

Also in response to Title XIV, we have asked the Office of Science and Technology Policy to initiate the establishment of the Subcommittee on Food and Natural Resources. We hope that within a group such as this we can develop an interagency coordination mechanism in human nutrition.

Nutrition Status Monitoring

The Farm Bill requires that the Department and HEW develop a proposal for a comprehensive nutritional status monitoring program. This proposal will be submitted shortly to your Committee. As you know, this proposal contains joint plans for establishing a national system that will monitor the nutritional status, nutritional quality of the food supply, dietary practices, nutrition knowledge and attitudes, and effectiveness of food and nutrition programs.

The proposal will include the total national needs for monitoring the nutritional status, nutritional quality of the food supply, dietary practices, nutrition knowledge and attitudes, and effectiveness of food and nutrition programs. It will include assessment, monitoring and surveillance activities designed to determine nutrition-related risks to health that warrant intervention and to provide information that will assist in the selection and evaluation of intervention alternatives.

The proposed system will include dietary assessments to provide ongoing monitoring of the nutrients present in individual foods and groups of foods as consumed. The efforts would be carried out to obtain new data for the

Nutrient Data Bank as well as broadening the coverage of total diet studies such as the "Market Basket Survey". Analyses are proposed for meals offered in fast food restaurants or as "TV dinners".

The proposal calls for integrating the information from the National Food Consumption Survey (NFCS) USDA and the Health and Nutrition Examination Survey (HANES) of HEW. The NFCS is proposing to collect information every 5 years in order to make the information more timely and relevant to food program needs. The development of a means is being considered for obtaining the necessary "Hanes type" data related to the findings of NFCS.

Development is proposed for new criteria and new methodologies to evaluate the nutritional contribution of food programs. Attention is called to the need to expand those pilot projects on WIC and the child nutrition programs which have proven most successful in evaluating the nutritional impact of the programs on participating children. It is recommended that the annual evaluation of the Food Stamp Program be based on a special sample of low-income households.

The proposal also calls for specific coordinating mechanisms, among Federal agencies and within those agencies,

Comprehensive Plan in Nutrition Research and Extension

The Farm Bill also requested a comprehensive national plan for human nutrition research and extension, as well as a feasibility study of regional nutrition research centers. The reports on these are due on or before September 29, 1978. We intend to meet both of these requests.

The FY '79 Human Nutrition Research Budget

The following table shows the changes in human nutrition research funding in the Department since FY 1977.

(\$ in millions)

A summary of the estimates for each agency and the areas to be emphasized is as follows:

SEA Human Nutrition Center.--Most of the nearly \$8 million increase for human nutrition research in 1979 is to be applied outside the Department. Research areas include \$2.9 million for research on human nutrient requirements and \$5 million for human nutrition research aimed at identifying and appraising the nutritional properties and contributions of foods, including the study of fresh and processed foods; assessing bio-availability and chemically-useful forms of nutrients in foods; and determining and evaluating nutritional antagonists in foods.

SEA Cooperative Research and Competitive Grants Office.--The \$5.3 million increase is a net change representing (a) an increase of \$6 million in the Competitive Grants Program for human nutrition research and (b) an estimated reduction in Hatch Act formula funds related to the overall reduction in that program.

Food and Nutrition Service.--The plans for FY 1979 are to continue the projects underway in FY 1978 which are primarily related to the Food Stamp and Child Nutrition Program. There will be a reduction from FY 1977 and FY 1978 due to the completion of special food consumption surveys.

Mr. Chairman we believe that in the short time since the enactment of Title XIV of the Farm Bill, the actions of the Department demonstrate a strong commitment to the needs for human nutrition research. We make no pretense that our actions to date have completely met those needs. However, we want to assure this Committee that we are on the way and that continued progress can be expected.

We will be glad to answer any questions you may have.

